DEPARTMENT

OF

Lands, Mines and Fisheries

MINING OPERATIONS

IN THE

PROVINCE OF QUEBEC

FOR THE YEAR

1904

BY

J. OBALSKI,

MINING ENGINEER AND INSPECTOR OF MINES.

QUEBEC:

PRINTED BY CHARLES PAGEAU
Printer to the King's Most Excellent Majesty

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HON. S. N. PARENT

Minister of Lands, Mines & Fisheries

Quebec

SIR,

I have the honor to submit my yearly report on the mining operations in the Province.

This industry is constantly progressing, while every year brings new developments and fresh discoveries. A fact worthy of note is the introduction of electric power in the asbestos and chrome mines of the Coleraine region and in the Eustis copper mines.

As an appendix to this, you will find a report on the exploration made by me at Lake Chibogomo. I cannot too earnestly call your attention to this new district and to the important discoveries made there, for I consider it as destined to play a great rôle in the industrial development of our Province.

I have the honor to be

Sir

Your obedient servant

J. OBALSKI, M. E.

Inspector of Mines.

Quebec, February 1905.

EXPLORATIONS IN THE LAKE CHIBOGOMO REGION

Lake Chibogomo is on the water-shed of Hudson's Bay and, at its north-eastern extremity, is two days' journey or about 35 miles from Lake Mistassini.

This region, which we shall in future call the *Chibogomo Mining District*, was traversed in 1674 by the Jesuit Father Albanel, then explored in 1870 by Mr. James Richardson, of the Geological Survey, and in 1885 by Mr. A. P. Low of the same survey. In 1897 Mr. Henry O'Sullivan made an exploration, and surveys were also made in 1899 by Mr. C. E. LeMoine. In 1903, Mr. Peter McKenzie made two trips there: one in the spring and the other in the summer, and, in the autumn of 1904, I made in company with him an exploration which forms the subject matter of this report.

From a geological and mining standpoint, the report of Mr. James Richardson (G. S. 1870, page 292) is the first and the most important. It mentions the existence in that region of a zone of chloritic schists, diorite, serpentine, conglomerates and granite which he did not identify, but in which he points out the existence of iron and copper pyrites, of magnetic iron and ochre. At the northwestern end of the lake, he found a development of serpentine leading from the portage as far, he thinks, as the Juggler's Mountain to the west. He found on a hill of serpentine, which we have since called the *Magnetic Cone*, a mass of blackish limestone and he observed in its vicinity a local magnetic deviation of 146 degrees. I have since ascertained that this limestone is magnesite, containing, like the surrounding serpentine, grains of magnetite and possessing magnetic properties to such an extent that there is an absolutely neutral zone where the variation is really 180 degrees. We shall return to this question later.

In 1885 (G. S. 1892 to 1895, Vol VIII, p. 259 L.) Mr. A. P. Low explored that region and verified the facts pointed out by Mr. J. Richardson. He calls attention to the similarity of the rocks examined to those of Sudbury, and shows that the granites found there are not Laurentian, but are long subsequent to the Huronian formation and that gold might exist there. He says that the district presents important indications of industrial minerals and would be worth the trouble of prospecting.

In 1897 M. H. O'Sullivan (1st and 2nd reports on the country between Lake St John and James Bay) mentions the observations made by previous explorers and, on the portage between lakes Chibogomo and Waconnepi he found near the magnetic cone a variation of 166 degrees caused, he thinks, by some deposit of magnetic iron in the neighborhood. He also speaks of a spring of water of considerable volume at that place.

Relying on these data, Mr. Peter McKenzie undertook an exploration in the spring of 1903 from which he brought back good specimens of asbestos, iron pyrites and rocks showing the nature of the formation. He returned there during the summer and found chalcopyrite and bornite. These specimens and the accompanying information having been submitted to me, I recommended the Government to have these discoveries corroborated and I started on that exploration in the middle of August 1904 with Mr. Peter McKenzie.

We proceeded from Quebec to Roberval on the 12th August by the Quebec and Lake St John Railway and, after procuring Montagnais guides at Pointe Bleue, we had our provisions and canoes conveyed by vehicle to the *Portage à l'Ours* 25 miles from Roberval on the Chamouchouan river as there is a good road leading thither.

On the 19th August we took to our canoes, followed the Chamouchouan river for 33 miles and the Chigoubiche river for 22, reaching the lake of the same name on the 27th. From that point we crossed lake Chigoubiche (14 miles) situated 6 miles from lake Chamouchouan (8 miles) whence the river Nikaubau (20 miles) leads to the lake of that name (6 miles), then crosses a series of lakes of minor importance leading to the height of land (14 miles); from there we crossed several small lakes (5 miles) finally reaching great lake Obatogoman (15 miles full) of islands; then, after 10 miles of river and portage, we came on the 9th September in the evening to the head of lake Chibogomo (20 miles). This we crossed only on the 11th September, proceeding then to Paint Mountain at its other end where our work of investigation was really to begin. The country traversed during the journey, as far as lake Obatogoman, is analogous to that found north of the St Lawrence and, for a complete description, refer to the reports above cited and specially to that of Mr. H. O'Sullivan.

The land is generally undulating, fairly well timbered; the soil is clayey as far as the foot of the Pemonka rapids (35 miles from Lake St. John); from there to the Chaudière falls, the banks of the Chamouchouan river consist of steep Laurentian granitic hills, as much as 700 or 800 feet high and on which there is but little good timber. The river itself to that point, a length of 20 miles, is but a series of heavy rapids very difficult even for poling. The great Chaudière falls, at least 100 feet high, constitute a splendid water-power which I calculated could furnish 100,000 horse-power at low water. These falls are followed by a series of other falls and rapids, which are likewise fairly considerable for a distance of 3 miles to the forks. At this point the river turns to the north and is the way to lake Mistassini *viâ* the Chief's river. It may also be followed to rejoin lake Chamouchouan, but the Indians find this way much more difficult going up, although there are fewer portages: it is however easier to descend that way with larger canoes than by the Chigoubiche.

We then took the river Chigoubiche which runs north-westwardly. This river is rather shallow and rocky and there are 15 portages on the 22 miles of the way up to reach lake Chigoubiche. On this river are several falls and rapids that might be used as water-powers, amongst others the Vermilion falls, 50 feet high, capable of furnishing 9,000 horse-power, and the Gras falls, 40 feet high, 4,000 horse-power.

The valley of this river and lake present a series of hills of slight elevation near the rapids and low and at times swampy ground near the still water. The soil consists of sandy loam and there is a great variety of trees of good dimensions, in some valleys.

The ascent of the Chigoubiche river can be effected only with small canoes from 15 to 18 feet long and, as it is impossible to cross the lakes with these in heavy winds, delays of several days are sometimes necessary, as we found. From lake Chigoubiche to lake Chamouchouan (a distance of 6 miles) the country is fairly level and there is only one portage between the waters of the rivers Chigoubiche and Chamouchouan. Then, after following a very winding river, through swamps and small lakes whence one sees well-wooded hills, lake Chamouchouan is reached.

The Hudson's Bay Company had a small post at the head of the lake. It was abandoned two or three years ago, but the *McKenzie Trading Company* has built close by a small log camp in which it keeps a depot of goods and provisions. From this lake we proceed by the river Nikaubau to lake Nikaubau. The country is level, consisting of sandy loam, with a fair abundance of small timber, Banksian pine and black spruce predominating. Having stopped near this lake we explored on the south-west side the Foam falls and Askatiche rivers, whose valleys are also level, with the same sandy loam and small timber, a portion of which has recently been burned.

The river Askatiche, which is of rather considerable size, is the discharge of a very large lake whereof we saw the bays only.

According to the guides, it is much larger than as shown on the maps and it seems to be the way leading to the waters of the St. Maurice. This lake forms a large sheet of water parallel to lake Nikaubau (?)

From lake Nikaubau one follows for 14 miles a series of lakes of medium size to the height of land or water-shed represented by a chain of wooded hills some fifty feet high, whose altitude is 1275 feet above sea level. From that point one descends through undulating land, covered with small timber, by a narrow river with three or four portages to great lake Obatogoman which discharges by the river of the same name into the Nottaway river. This lake, which has been only incompletely surveyed, contains several hundreds of small islands of various dimensions, those I visited consisting of granite.

Towards the end of the lake one comes in contact with the *Huronian* formation which is thence followed constantly, and prospecting for the minerals of that formation can then be begun. The road then continues with 4 portages by a narrow river flowing through undulating land covered with small timber, with some widenings forming ponds, to lake Chibogomo.

As far as the end of lake Obatogoman the rock consists exclusively of Laurentian gneiss in which are numerous veins of pegmatite containing a little white mica, but not of workable dimensions.

There may, however, be some of larger dimensions in the interior. Scattered through the gneiss, magnetic iron also is found at various points, but in too small quantities. Above the Chaudière falls a little pink calcite is also to be seen. On the other side of the height of land I met with a little grey gravel in which, by panning, I found a couple of very minute colors of gold, but I attach little importance to this indication.

To sum up, as far as the end of this Laurentian formation I noticed no mineral having any industrial value and it is really only from the north-eastern extremity of lake Obatogoman that one finds a variety of rocks worthy of interest and I consider that an examination and prospect should be begun from the first portage towards lake Chibogomo, as the rocks there are well exposed.

CHIBOGOMO DISTRICT

Lake Chibogomo is a large sheet of water of a variable length of about 20 miles and an average width of about 10 miles, with several deep bays. It has many islands, some being of granite and other of schists and diorites. The beaches consist of boulders, generally dioritic; the land is undulating and covered with timber among which are large trees of canoe-birch. At the north-eastern extremity are the Paint or Vermilion Mountain, the Juggler's Mountain, the Sorcerer's Mountain and others not exceeding 500 feet in height. This lake has two outlets into lake Doré, the head of the river Chibogomo.

I specially prospected this district from the first discharge of the lake to the head of McKenzie Bay and on both of its shores.

GOLD

About a mile before reaching Copper Point, on the shore, among the dioritic boulders, are some pieces of yellowish quartz in which I found gold for the first time, The shore rises in a slope which, further on, becomes Paint-Mountain. A few hundred feet from the beach are numerous blocks of quartz and one comes upon an out-cropping which I followed for a length of 2000 feet in an easterly and westerly direction. At the highest

point on the east, about 80 feet above the lake, the vein is fully indicated by a mass of quartz which seems to dip vertically; the south-east wall is very clear and in the transversal direction I measured 30 feet of quartz which is afterwards covered with earth and trees. I was thus unable to get to the other wall and there must consequently be a considerable mass at that spot.

This quartz is the same as that found on the shore of the lake and gold can be seen at several places in small grains in the quartz. Pyrite is also seen there in pockets which sometimes contains copper. In some parts of the vein the quartz is cavernous, probably owing to the decomposition of the pyrite. This pyrite itself contains gold. I crushed roughly with a hammer some quartz which showed no gold and in nearly all the specimens of a few pounds only, thus treated and afterwards panned, I found colors which were generally light. I then had various pieces of quartz broken up and obtained lumps showing gold. I also washed in a pan the debris representing about a hundred pounds. The concentrate, weighing about 8 ounces, showed numerous colors and the assay showed 9.4 ounces of gold and 3.6 ounces of silver to the ton. Taking the value of gold at $20.00 to the ounce and that of silver at $0.58 this would give $190.00 per ton of concentrate.

A specimen of quartz, showing neither gold nor pyrite, yielded as follows:

Gold	0.45 oz per ton	$ 9 00
Silver	0.10 oz " "	0 06
		$ 9 06

Iron pyrite mixed with rock yielded:

Gold	0 4 oz per ton	$ 8 00
Silver	1 10 oz " "	0 64
		$ 8 64

A specimen of copper pyrite from this vein taken by Mr. P. McKenzie and assayed by Mr. T. J. Donald yielded 3.21 oz of gold, say a value of $64.00.

The other specimens were taken by me and assayed by Mr. M. L. Hersey,

Other specimens of quartz yielded no gold or only traces: the highest giving 0.04 oz say 80 cents per ton.

By panning the earth in the vicinity of the vein, I found in each pan very light colors amounting to 30 colors in one case. I also washed some earth from between the vein and the lake which gave me colors. I likewise found some at the outcropping of the copper vein, in the direction of the quartz vein in rusty rock on the top of Paint Mountain, on the other side of that mountain on Portage bay, and in the crevices of the rock at the entrance of that bay.

From all these facts I conclude that the quartz vein in question is truly gold-bearing quartz wherein gold exists in a finely divided state and that the pyrite contains a notable proportion of gold. The colors of gold found in the earth come from the disintegration of the rock and the decomposition of the pyrites. Without seeking to judge beforehand of the importance of this vein, which can be established only by other works, I consider that all the region of Paint Mountain should be carefully prospected, as colors have been found a couple of miles north-east of these outcroppings.

COPPER

Mr. Richardson (G. S. 1870-71, page 304) speaks of copper pyrite on the shore of lake Chibogomo near Paint Mountain, and Mr. McKenzie ascertained the existence of chalcopyrite and bornite in that region on a point which he called *Copper Point*. A few blasts at that place showed the beginning of a vein a couple of feet thick in which these two varieties of ore are found mixed with quartz. The vein seems to run in a northerly direction, the encasing rock being a variety of schistous diorite called by Richardson chlorite schist, in which are also pieces of chalcopyrite. Not enough work has been done so far to characterize this prospect, but it is interesting and is worth the trouble of developing. A specimen of massive chalcopyrite was assayed with the following result:

Copper	23 8%	=	worth $59 50
Gold	0 04 oz.	per ton,	worth 0 80
Silver	2 36 "	" "	" 1 37

A specimen taken by Mr. P. McKenzie and analyzed by Mr. T. J. Donald gave:

Copper	23 37%	equal to	$55 90
Gold	traces		
Silver	1 46 oz	worth	0 74

Another specimen assayed for gold only gave:

Gold	0 13 oz.	worth	$ 2 62

By panning the earthy debris in the crevices of the vein, I found colors of gold.

The gold-bearing quartz vein above mentioned contains small pockets of copper pyrites and, while prospecting on the top of Paint Mountain, I found small veins of quartz with a little chalcopyrite.

In his report for 1892 to 1895, page 257, Mr. Low observes that the deposits of iron and copper pyrites are, from a geological standpoint, in the same conditions as the nickel deposits of Sudbury and that it is not impossible that the latter mineral may be found in this region, although the assays so far made do not show any.

IRON PYRITE

Mr. Richardson mentions this product as having been found in the vicinity of Paint Mountain and he says that in some places the proportion in the rock may amount to 15 or 20 per cent. I verified this statement and found, especially on the south shore of Portage Bay, a dioritic rock and chlorite schist containing a great abundance of grains of pyrite. Work was done at that point in the hope that this pyrite might contain other minerals, but a specimen that was assayed showed that the iron pyrite contained neither gold nor traces of nickel or copper.

On the other side of Paint Mountain, towards the lake, are rather important outcroppings of rusty rocks and, after digging at that spot, very light porous quartz was discovered on the surface which, at a depth of a few feet, becomes impregnated with iron pyrite. This mass seems rather important and a large deposit may be looked for there. The assay of a specimen gave:

Proportion of pyrite in the rock	50.83%
Sulphur in concentrate	44.94%

It contains neither gold nor copper.

A short distance below, towards the lake, is a deposit of *red ochre* which has given the locality the name of Paint or Vermilion Mountain. The first explorers merely mentioned this deposit of ochre; but it differs greatly from the deposits of ochre we know of in other regions and which are found in swamps, being due to the precipitation of oxyde of iron coming from ferruginous water, while here the oxyde of iron is due to the decomposition of the pyrites in the vicinity mentioned above. From this standpoint this ochre is remarkable as being an indication of deposits of pyrite, but it is of little value as ochre. Moreover, at other points on the mountain, other small deposits of earthy oxyde of iron are found which are generally red, and there are many outcroppings of rusty rocks.

ASBESTOS

Serpentine was mentioned by Richardson as existing on the magnetic cone, but he does not speak of asbestos. Mr. P. McKenzie, in a first exploration, found that a large island at the head of McKenzie Bay consisted of serpentine and he discovered there some veins of fine asbestos. Some blasts were afterwards fired at points where asbestos showed and I ascertained by 5 or 6 different prospects, that on the west part of the island called *Asbestos Island*, over a distance of from 600 to 700 feet, commercial asbestos was to be found.

The serpentine is analogous to that of the Eastern Townships, but a little darker in color; in some places it is compact, and somewhat hard and, in others, schistous and broken. Asbestos is not found here exactly as it is at Thetford and Black Lake, but it is certainly abundant enough

to justify mining operations on the island. Its length varies, but sometimes attains 2½ inches in a single thread. At one point I saw blocks of fibre as much as 6 inches long but divided into several smaller veins. The island consists of a hill 150 feet high, but in the centre and on the eastern side, I found only a black serpentine with a black and semi-metallic streak. Mr. Hersey considers that this color is due to earthy oxyde of iron. There is a strong magnetic attraction all over the island, and the rock itself is slightly magnetic. The section known to contain asbestos is about 600 or 700 feet with a height of from 60 to 80 feet above the lake. At several points where the serpentine is schistous, large blocks of hornblende are found, sometimes presenting a fibrous aspect sufficiently pronounced to allow of its being used as asbestos, being similar to the specimens from Italy that I have seen.

On the north shore of McKenzie Bay, from the magnetic cone to the entrance of the Rapids river, there is a continuous development of fine greenish serpentine, very compact. I penetrated but a slight distance inland and I saw only very small fibrous veins near the lake, but I am inclined to think that regular prospecting would lead to the discovery of commercial asbestos. This belt of serpentine also runs for several miles, especially on the left bank of the Rapids river and I can thus say that I found it over an approximate distance of seven or eight miles from the magnetic cone. It is also quite probable that it continues further. Mr. Richardson thinks it goes about a couple of miles in the direction of the Juggler's Mountain, but my inspection of that mountain revealed nothing but diorite.

In the report of the Geological Survey for 1870 we find that the assay of that serpentine by Dr Sterry Hunt showed numerous grains of chromic iron and the presence of nickel.

I may mention that Mr. Wm. McOnatt in his report on an exploration of the Lake Abbittibi region (G. S. 1872-73 page 155) states that he found on an island in that lake a strongly magnetic serpentine which, according to the assay, contained chrome and nickel. Perhaps therefore there may be a serpentine formation at that spot and this should be pointed out to prospectors.

I also found serpentine on the south shore of the narrows leading to McKenzie Bay, but I did not observe any fibrous portions.

MAGNETIC IRON

Magnetic iron has been found in other parts of this region.

On the south-east side of Paint Mountain I verified the indications mentioned by Mr. Richardson. After passing Copper Point, in the direction of the mountain, a rock is found of dioritic aspect, containing a great many grains of magnetic iron. It is possible that larger masses may be discovered by working. In any case, this deposit may, for the future, constitute a reserve of ore of low grade owing to its mixture with the rock, but which can easily be concentrated. Mr. Richardson says that he found it over a width of 50 feet which he followed for 200 paces and he estimates that this mass may contain from 15 to 20 per cent of iron. This is possible, but it should be confirmed by working and by assays.

A kind of black serpentine with a semi-metallic streak exists in great abundance on Asbestos Island. This serpentine is also magnetic and contains a certain proportion of magnetic iron in the pulverulent state from which it derives its color. It is possible that in this region the magnetic iron is not always scattered and that searches will result in the finding of larger masses.

In addition to the above various indications, Mr. McKenzie found on the south-east side of the Sorcerer's Mountain small veins of a compact ore very strongly magnetic and which showed when assayed :

Iron	65.43
Sulphur	0.17
Phosphorus	0.04
Titanium	Traces.

This ore is found in the rock in numerous small veins of from one half an inch to an inch and some parts possess the properties of loadstone.

MAGNETIC CONE.

Mr. Richardson says that at this point he found what he calls a vein of carbonate of lime. I carefully examined the place and found that in its vicinity the magnetic needle was so affected that it turned completely around from north to south, presenting an entirely neutral zone; this I moreover found to be the case over a distance of nearly a mile in an approximately easterly direction. I did not carry my investigation beyond that distance. Having caused an excavation to be made at this neutral point on the top of the hill 125 feet high which I called the *Magnetic Cone*, I found a ferruginous rock decomposed on the surface, which becomes solid lower down. This rock is slate-blue in color and the assay showed:

Protoxyde of iron	9.51
Carbonate of lime	12.42
Carbonate of magnesia	70.94
Silica (by difference)	7.31
	100.00

Corresponding to 7.47 of metallic iron.

It is pretty strongly magnetic and I am inclined to believe that the iron it contains is chiefly in the state of magnetic iron mixed: this can be ascertained by crushing the rock from which numerous magnetic grains may be separated by the magnet.

The portion decomposed on the surface showed:

Metallic iron	11.87
Phosphorus	0.02
Sulphur	0.30

It seems more strongly magnetic than the solid rock.

The serpentine of this magnetic cone, containing 20 of magnetite, taken in the vicinity of the rock above mentioned has an effect on the compass which may compare with the most magnetic ores I have examined. It is possible also that the magnetic parts may be loadstone. I consider these facts very curious and interesting to study and I am inclined to believe that deeper workings would lead to the discovery of ores with a higher percentage of iron and offering suitable conditions for industrial utilization. In any case it is worth while to make the trial.

I also went over this section with the dip needle and found the attraction considerable over a pretty large area, the attraction frequently reaching the maximum of 90 degrees. This was pointed out by Mr. Richardson, who observed a variation of 146° at one point, and by Mr. O'Sullivan, who observed 166° at another.

A quarter of a mile east of the cone and near the portage is an abundant spring supplying a great quantity of cold water, which did not seem to me to possess any mineral properties.

LOCAL GEOLOGY OF THE DISTRICT.

Starting from the contact of the Laurentian with the so-called Huronian formation, found to the north-west of Lake Obatogoman, one follows a formation which is generally dioritic and well-marked in the portages, while the beaches consist of large rounded boulders of diorite, and granite with some pieces of hard limestone, probably similar to the limestone of Mistassini. The massive diorite varies in color from dark to light green and sometimes presents a schistous appearance. It is frequently crossed by veins of quartz. These conditions continue as far as Lake Chibogomo. Nevertheless, the islands in the north-east part of that lake consist of coarse-grained granite similar to that of the islands in Lake Obatogoman and differ from the Laurentian granites.

On arriving at the large island of the portage where Paint Mountain lies, more broken country is found and the north-east part presents a more schistous and greenish aspect. Messrs. Richardson and Low called these rocks chlorite schist. The other side of Portage bay has the same dioritic rocks, but, on entering the narrows, granite is seen on the left shore, and conglomerates also granitic, which seem to be a contact rock thus transformed by granitic eruption. On the right shore are diorite and serpentine. On reaching McKenzie bay all the rocks on the north-west as far as the Juggler's Mountain are compact diorite. But on the south-east shore, between two deep bays, granite is likewise found alternating

with diorite, while conglomerates are seen on the islands. All the north-east part consists of a belt of serpentine, which includes the magnetic cone, and which is also strongly magnetic at several points. Behind this, diorite is again found.

I ascended the Rapids river which is navigable for canoes, and flows in a generally south-easterly direction; within a distance of 15 miles, there are 25 rapids and small falls and the river ends in a chain of small lakes. On both banks is a succession of diorite, granite and serpentine with banks of gravel and sand at some points. On the left bank, about the 4th rapid, I observed a development of talcous schist with compact talc in some places. About the 11th rapid there is a large mass of rusty schistous rocks, partially decomposed. About the 15th rapid, on the left bank, the serpentine is well developed and presents a schistous appearance with hard fibres.

At the last lake, which I reached, but which is not yet the head of the river, the formation is granitic. I carefully examined the rocks along this river and washed the sand and rusty gravel I came upon, but I found no gold or any indications of other minerals. Nevertheless these rusty rocks deserve further prospecting.

The serpentine seen at the start on the left bank and which crosses the river about the 15th rapid, belongs to the belt running from the magnetic cone and therefore covers a considerable area which I mentioned as being 7 or 8 miles but which extends much further. I tried to scale this river but the magnetic attraction was too strong to allow of my obtaining any good results with the needle. On both sides of the river the rocks are covered with moss and there is but little timber widely scattered, consisting chiefly of Banksian pine, which makes it very easy for travelling.

TIMBER AND SOIL

Along the road followed after leaving Lake St John and after passing the Chaudière falls, there is an abundance of timber generally of small dimensions but very suitable for the manufacture of pulp. It consists chiefly of small white birch and poplar in the old burnt districts, balsam fir, black spruce, Banksian pine, large white birch and a little grey spruce.

The black spruce is generally very tall and of good size, a diameter of 10 to 12 inches being frequently found with a height of 60 to 70 feet. In the neighborhood of Lake Chibogomo are large birch trees from which the Indians get bark for their canoes. On the southern slope of the height of land there are some valleys with good sized grey spruce. Judging by the fallen trees, there must have been a great deal of red spruce here formerly, but it has all been destroyed by the sawfly. A few young trees endeavoring to shoot up are seen here and there.

Where the land is low the soil consists of sandy loam which could certainly be cultivated and there are large areas of such land along the road we followed, but less in the region north of Chibogomo where the ground is more broken.

The climate of that region is similar to the average climate of the counties north of the St Lawrence. We had some very warm days in the months of August and September. It is true that we had cold weather with snow at the beginning of October, but, on our return, we learned that the same weather had been experienced between Quebec and Lake St John and our Indian guides told us the snow does not remain on the ground until after the beginning of November. The altitude of Lake Chibogomo is only 1150 feet above sea level and the so called mountains in the neighborhood do not rise more than 500 or 600 feet above it.

FISH AND GAME

Ouananiche is found in the Chamouchouan river, but it does not ascend higher than the Chaudière falls. There is not much fishing above this in the rivers, but in the lakes are doré and pike, one variety of which in great Lake Chibogomo seems to be the maskinongé. We caught some weighing twenty pounds, but some have been caught weighing over thirty. There are also the witouche and an excellent variety of white fish, weighing several pounds. The Indians say that sturgeon are caught in Lake Obatogoman, but I saw none.

In Lakes Chigoubiche, Obatogoman and Chibogomo large sized *touladi* or grey lake trout (fork-tailed) are caught. I saw no brook trout, but on a previous journey Mr McKenzie caught one weighing four pounds in the Rapids river. In the upper part of this river we saw the bottom covered with fish-spawn, but I could not ascertain to what species they belonged.

There is an abundance of small game throughout the region, the different varieties of partridge and duck, also hares. We saw but little large game, but from the results of the Indians' hunting we learned that there are many caribou, black bears and lynx. There are neither moose, red deer nor wolves. Many Indian families make a livelihood by trapping fur-bearing animals such as beaver, marten and mink.

SUMMARY

In the small section I explored, covering a radius of 5 or 6 miles, I found the following as regards the part north of Lake Chibogomo :

1. A great development of serpentine over a distance of more than 7 or 8 miles ;

2. On Asbestos island, where this serpentine was prospected, many veins of asbestos similar to that of the Eastern Townships and whose length attains two and one-half inches.

3. Magnetic iron probably in great abundance, seeing the great attraction exercised on the needle in that region.

4. Indications of iron pyrites from which the existence of an important deposit may be presumed ;

5. Copper ore of good grade in sufficient quantity to justify further search :

6. Gold-bearing quartz indicated by a very considerable outcropping showing gold in the rock and in the surrounding debris ;

7. The probability of discovering the other industrial minerals which usually accompany such formations.

The formation of this district, called the Huronian formation, is well developed and, according to a map recently published by Dr. Bell, director of the Geological Survey, this formation covers a considerable area in the western section of that part of the Province where a belt 140 miles wide from North to South is indicated, through which the new trans-continental railway will run.

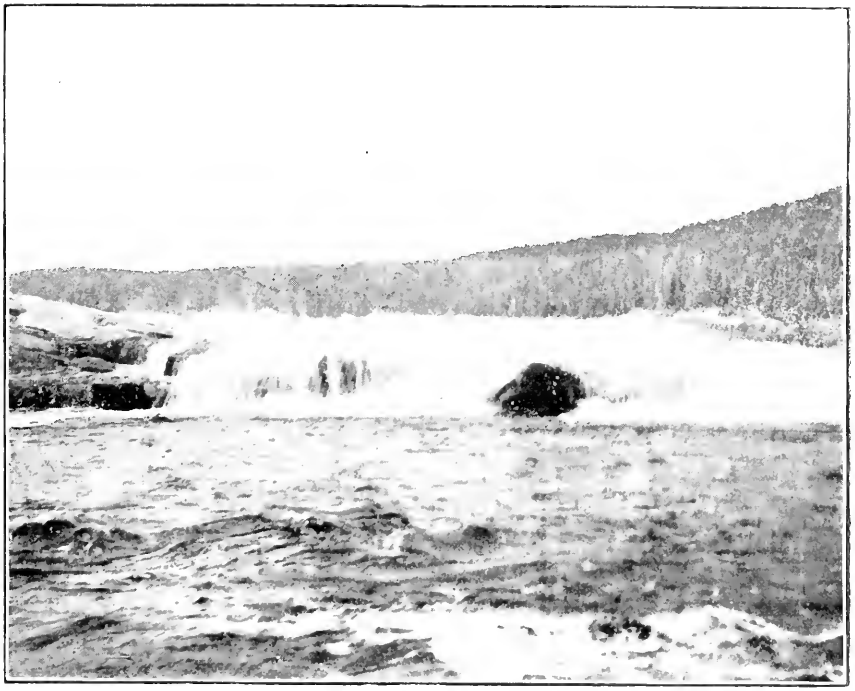
All the explorers of the Geological Survey who have visited this region agree as to the possibilities it offers from a mining point of view, belonging as it does to the same great formation containing the important mining districts of Lake Superior, of Northern Ontario and of Temiscamingue.

The land is generally undulating, the highest mountains not exceeding 500 or 600 feet. It is well timbered with pulp-wood trees, possesses important water-powers and contains sufficient arable land to be self-supporting, the climate being favorable thereto.

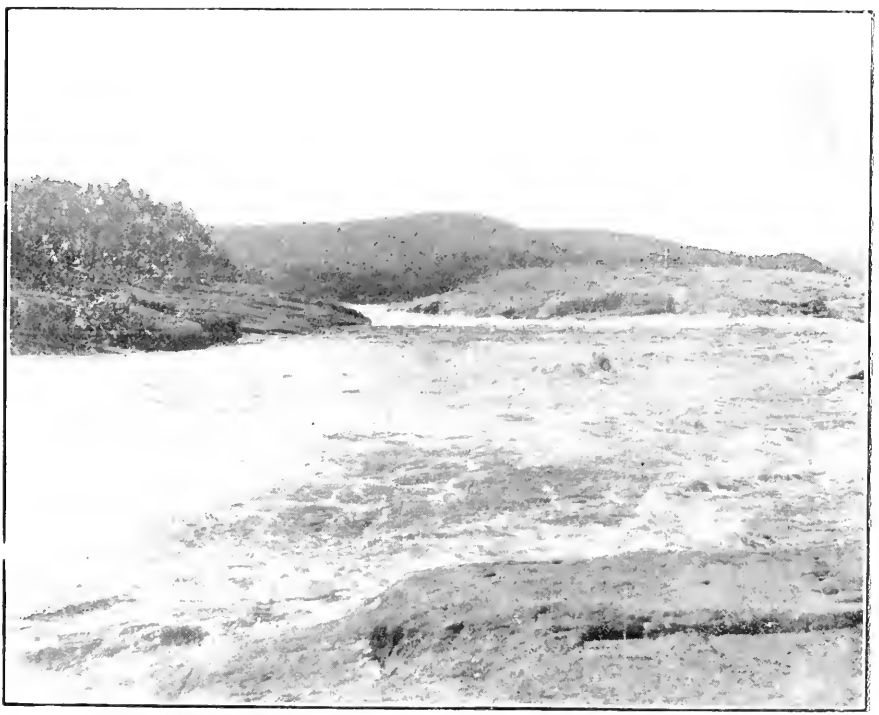
It is probable that all these advantages will encourage the building of a railway, which need not be more than from 100 to 200 miles long, to connect that district with existing lines.

A company has been organized by Mr. McKenzie under the name of the *Chibogomo Mining Company* for the purpose of developing these discoveries and it is preparing to work this summer.

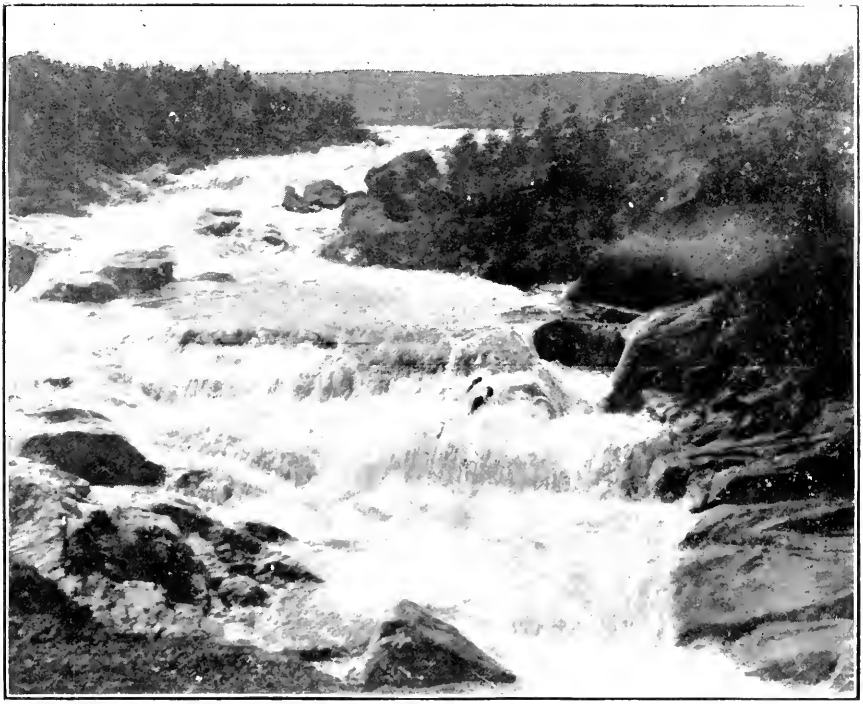
———o———



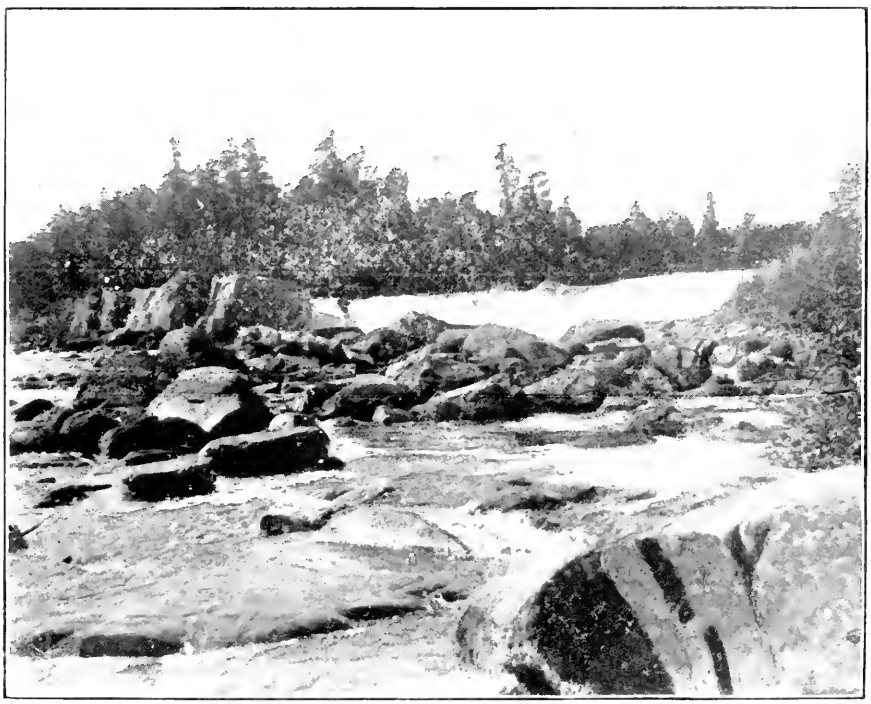
Chaudière Falls (Chamouchouan River) Seen from below



Chaudière Falls Seen from above



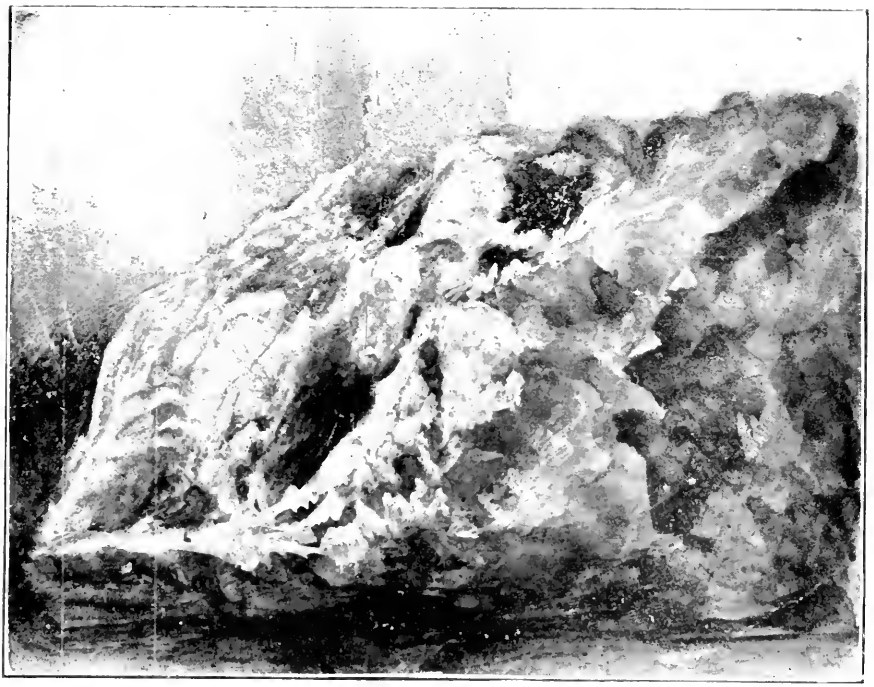
Vermilion Falls (Chigoubiche River)



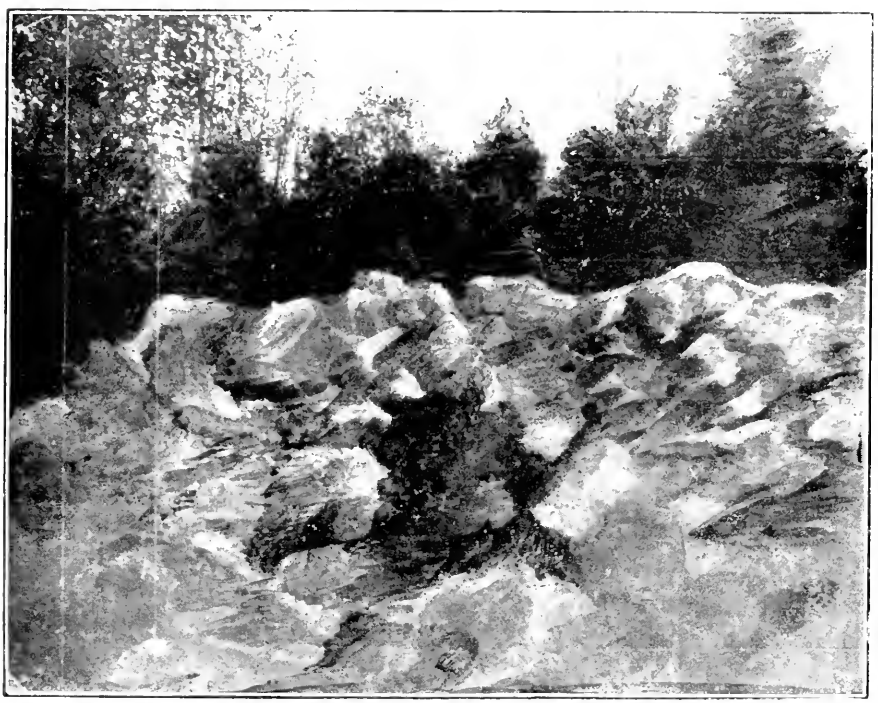
Gras Falls—(Chigoubiche River)

Lake Chibogomo and Mountains on the North—From middle of Lake

Lake Chibogomo and Sorcerer's Mountain.—(From Copper Point)



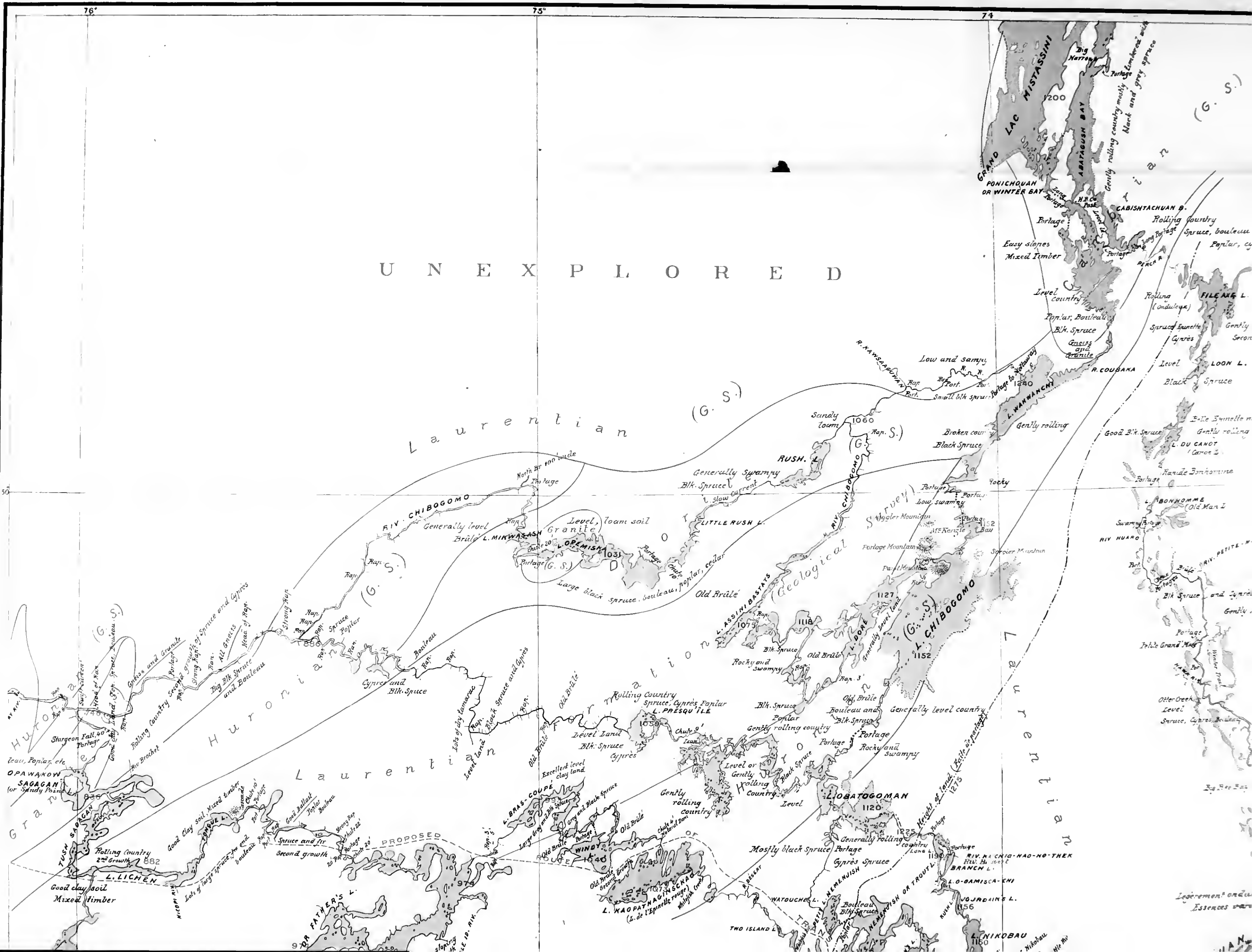
Vein of gold-bearing quartz—Seen from the East. (3 feet to the inch)



Vein of gold-bearing quartz—Seen from the South wall. (3 feet to the inch)

Asbestos Island—From Magnetic Cone

Prospect on Asbestos Island



76°
75°
74
50
UNEXPLORED
GRAND LAC MISTASSINI
ABATAGUSH BAY
Big Narrows
1200
PONICHOUAH OR WINTER BAY
CABISHTACHUAN B.
Rolling Country
Easy slopes
Mixed Timber
Level country
Poplar, Bouleau
Blk. Spruce
Gneiss and Granite
PERCH R.
R. COUBAKA
FILEAU L.
LOON L.
L. WAHWANCHY
Low and swampy
Small blk spruce
1060
Sandy loam
RUSH. L.
Generally Swampy
Blk. Spruce
LITTLE RUSH L.
Laurentian (G. S.)
Huronian (G. S.)
RIV. CHIBOGOMO
Generally level
L. MIKWASASH
L. OPEMISKA
Granite
Level, loam soil
1031
Large black spruce, bouleau, poplar, cedar
Old Brûlé
L. ASSINIBASTATS
1075
1118
1127
L. DORE
L. CHIBOGOMO
1152
Geological Survey
Huronian Formation
Laurentian
L. BONHOMME
RIV. HUARD
Rolling Country
Spruce, Cyprès Poplar
L. PRESQU'ILE
1059
Level Land
Blk. Spruce
Cyprès
Generally level country
Portage
Rocky and Swampy
Gently rolling country
Mostly black Spruce
L. OBATOGOMAN
1120
1225
Height of land (Faîte de partage)
1275
RIV. NA CHIG-NAO-NO-THEK
BRANCH L.
L. O-OAMISCA-CHI
JOURDAIN'S L.
1156
L. NIKOBAU
1160
L. KAOPATNAGINSCHAU
(L. de l'Epinette rouge)
WINDY L.
1540
L. BRAS-COUPÉ
Excellent level clay land
TONGUE L.
L. LICHEN
882
Rolling Country
2nd Growth
Good clay soil
Mixed timber
OPAWAKOW SAGAGAN
(or Sandy Point L.)
TUSH SAGAGAN
Sturgeon Fall, 40' Portage
Granite
PROPOSED
WATOUCHE L.
TWO ISLAND L.
L. NEMENJISH
NEMENJISH OR TROUT L.
OUR FATHER'S L.
974

CARTE DU DISTRICT DE CHIBOGOMO

MAP OF THE CHIBOGOMO DISTRICT

Scale 2½ mile to an inch

LEGENDE — REFERENCE

Permis d'Exploration — P. L. Prospecting Licence

Permis d'Exploitation — M. L. Mining Licence

Minéraux — + Minerals

LAC WACOUNEPI

Lac Vert

Lac Oreille

Lac Long

JUGGLER MOUNTAIN

PORTAGE MOUNTAIN

SORCIER MOUNTAIN

PAINT MOUNTAIN

Portage Bay

Islands Bay

Portages Island

Bouleau Point

Copper Point

Male Island

LAC DORÉ

LAC CHIBOGOMO

GRAND LAC MISTASSINI

ABATAGUSH BAY

PONICHOUAN OR WINTER BAY

CABISHTACHUAN B.

PEACH R.

FILE AXE L.

LOON L.

R. COUBAKA

L. WAKWANCHI

L. BONHOMME (Old Man L.)

L. DU CANOT (Canoe L.)

RIV. HUARD

RIV. PETITE MEULE

Big Atke Bay

RIV. DU CHEF

TROUT L.

RUSH L.

LITTLE RUSH L.

RIV. CHIBOGOMO

L. DORÉ

L. CHIBOGOMO

L. PRESQU'ILE

L. OBATOGOMAN

L. NIKOBAU

L. DINACHOWGAMOCHENE

TWO ISLAND L.

L. NEMENUISH OR TROUT L.

L. OBAMISCA-CHI

L. JOURDAIN'S L.

BRANCH L.

HATOUCHE L.

Portage au Bouleau

Portage Mountain

Old Brûlé

Big Narrows

Long Portage

Rolling country

Spruce, bouleau

Poplar, cyprès

Gently rolling country mostly timbered with black and grey spruce

Gently rolling Second growth

Belle Epinette noire (Blk. Spruce)

Gently rolling country

Good Blk. Spruce

Mixed Timber

Easy slopes

Level country

Poplar, Bouleau

Blk. Spruce

Low and swampy

Small blk spruce

Portage to Nolaudy

Broken country

Black Spruce

Gently rolling

Sandy

Rapid

Portage

Height of land

Mostly black Spruce

Generally rolling country

Cyprès Spruce

Boulleau

Blk Spruce

Rocky and swampy

Old Brûlé

Generally level country

Gently rolling country

Level or Gently Rolling Country

Level

Gently rolling country

Blk. Spruce and Cyprès

Gently Rolling Country

Petite Grand'Mere

Otter Creek

Level

Spruce, Cyprès, Bouleau

Port. Grd'Mère

Légèrement onduleux

Essences variées

Gently rolling country mixed timber second growth

Rapide Bonhomme

Swampy Portage

Rapid Source Mathurin

Rapid Original

Granite

Diorite

Conglomerate

Serpentine

Gneiss and Granite

Magnetic iron

Iron pyrite

Calcite

Ochre

Copper

Gold

Talc Schist

Diorite & Schiste

Granite Gneiss

Diorite & Schiste Breccia

Mc Kenzie Bay

Full

Rapid

Portage

Rap.

Port.

Falls

Bay

R.

Mt.

Lake

Island

Point

Mountain

Creek

Trail

Height of land

Rapid

Portage

Rap.

Port.

Falls

Bay

R.

Mt.

Lake

Island

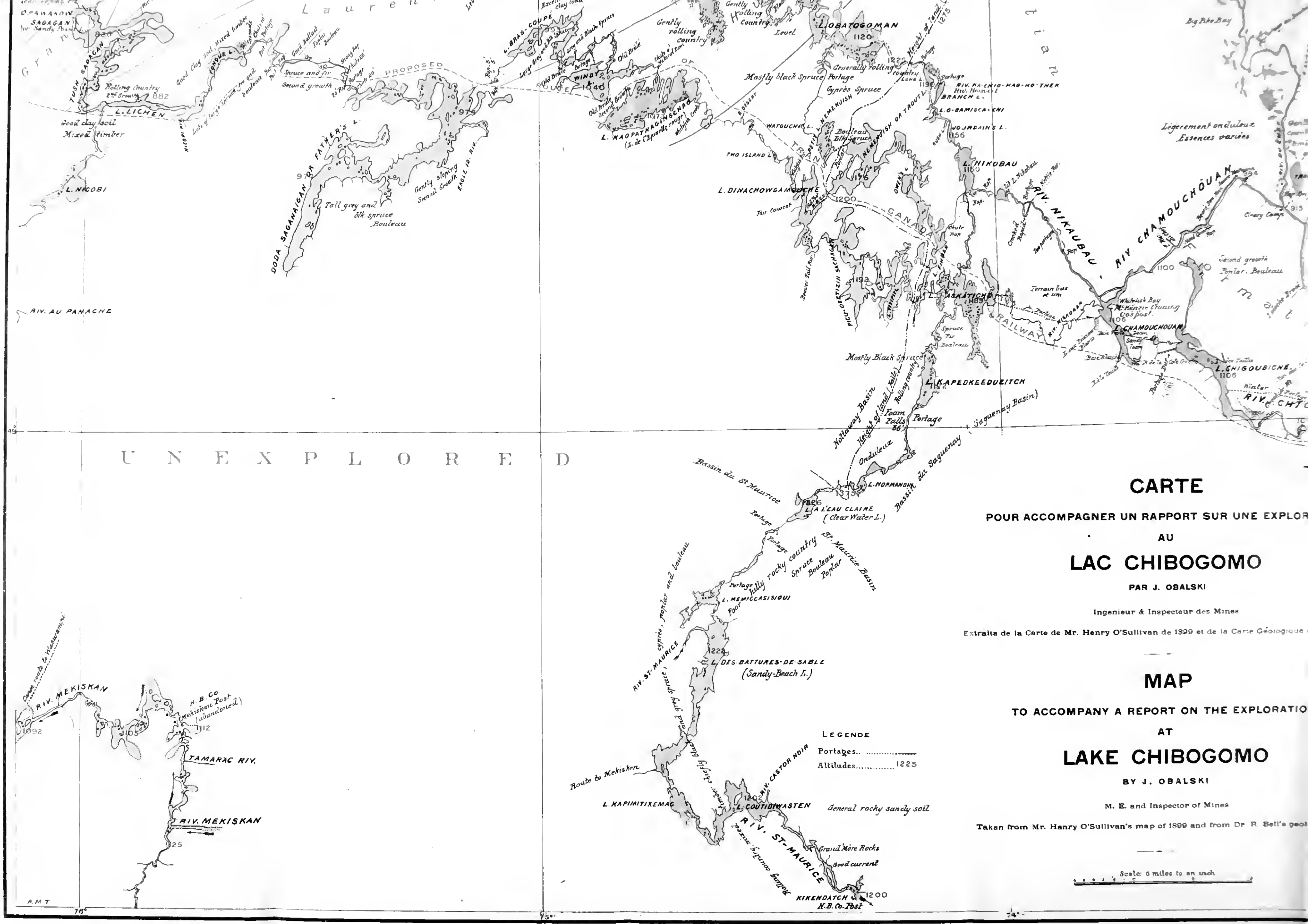
Point

Mountain

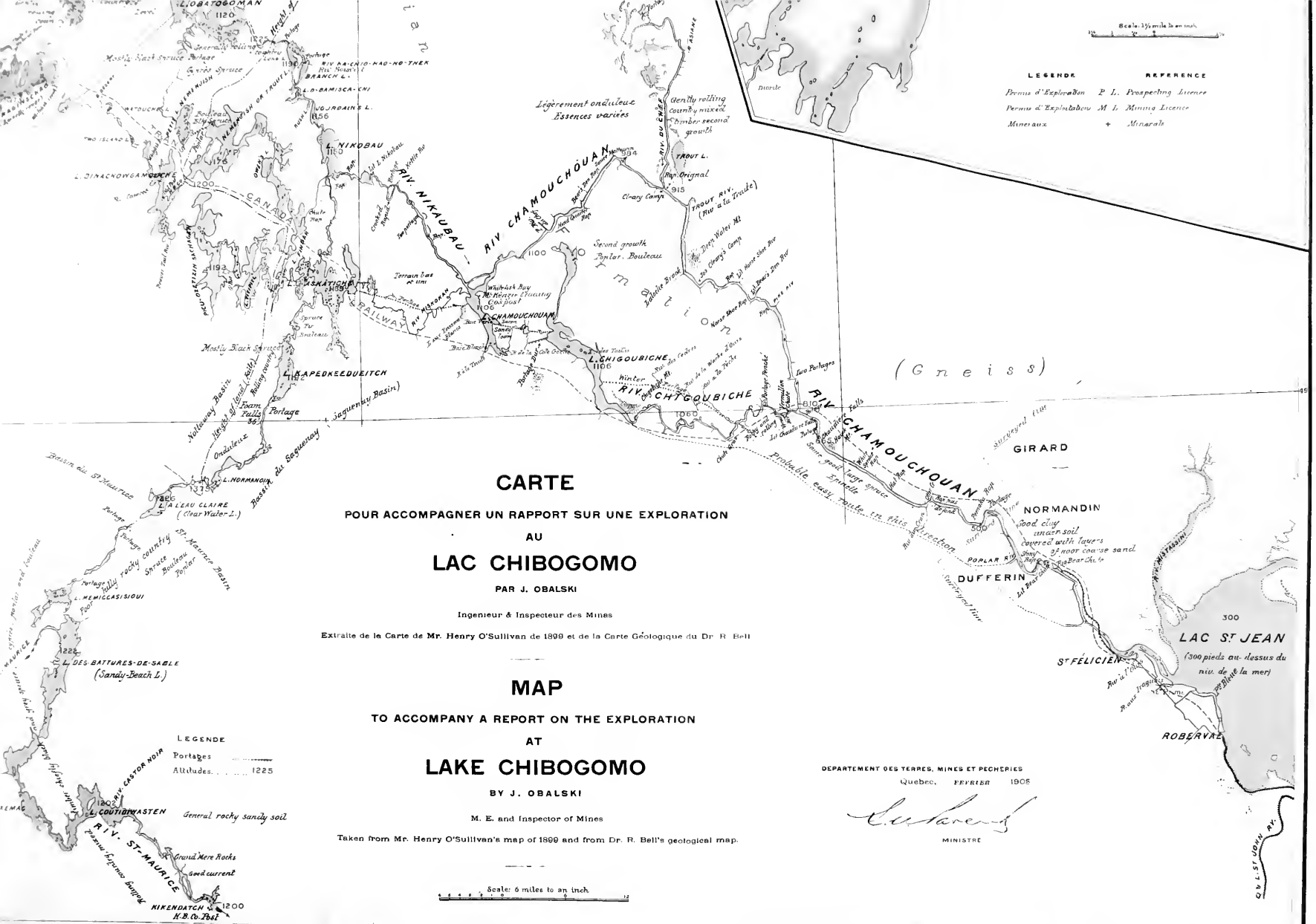
Creek

Trail

Height of land



CARTE
POUR ACCOMPAGNER UN RAPPORT SUR UNE EXPLOR
AU
LAC CHIBOGOMO
PAR J. OBALSKI
Ingenieur & Inspecteur des Mines
Extraita de la Carte de Mr. Henry O'Sullivan de 1899 et de la Carte Géologique
MAP
TO ACCOMPANY A REPORT ON THE EXPLORATIO
AT
LAKE CHIBOGOMO
BY J. OBALSKI
M. E. and Inspector of Mines
Takan from Mr. Henry O'Sullivan's map of 1899 and from Dr R. Bell's geol
Scale: 6 miles to an inch
LEGENDE
Portages
Altitudes 1225
UNEXPLORED
L. MISTASSINI
L. CHAMOUCHOUAN
RIV. CHAMOUCHOUAN
RIV. NIKAUBAU
L. NIKOBAU
L. ASKATICHE
L. KAPEDKEEDUEITCH
L. NORMANDIN
L. A L'EAU CLAIRE (Clear Water L.)
L. MEMICCASISIOUI
L. DES BATTURES-DE-SABLE (Sandy-Beach L.)
L. KAPIMITIXEMAC
L. COUTIDIWASTEN
RIV. ST-MAURICE
RIV. CASTOR NOIR
KIKENDATCH H.B. Co. Post
L. CHIGOUBICHE
L. OBATOGOMAN
L. DINACHOWGAMOUCHE
L. KAOPATNAGINSCHAG (L. de l'Epinette rouge)
DODA SAGAHAIGAN OR FATHER'S L.
L. LICHEN
TUSH SAGAGAN
L. NICOBI
RIV. AU PANACHE
RIV. MEKISKAN
TAMARAC RIV.
H. B. Co Mekiskan Post (abandoned)
Route to Mekisken
Canoe route to Waswanipi
Bassin du St Maurice
Bassin du Saguenay
Nottaway Basin
Height of land
PROPOSED CANADA TRANS RAILWAY
General rocky sandy soil
Grand Mère Rocks
Good current



CARTE

POUR ACCOMPAGNER UN RAPPORT SUR UNE EXPLORATION

AU

LAC CHIBOGOMO

PAR J. OBALSKI

Ingenieur & Inspecteur des Mines

Extraite de la Carte de Mr. Henry O'Sullivan de 1899 et de la Carte Géologique du Dr R. Bell

MAP

TO ACCOMPANY A REPORT ON THE EXPLORATION

AT

LAKE CHIBOGOMO

BY J. OBALSKI

M. E. and Inspector of Mines

Taken from Mr. Henry O'Sullivan's map of 1899 and from Dr. R. Bell's geological map.

DEPARTEMENT DES TERRES, MINES ET PECHERIES

Quebec, FEVRIER 1905

MINISTRE

THE CANADA ENGRAVING LITHO. & PTG. CO. MONTREAL

MINING OPERATIONS

IRON

There is nothing worthy of special mention in connection with our iron mines except the interest that continues to be taken in the magnetic sands of the North Shore as manifested by the sale of all the available lots and the numerous requests for information received at this office.

During the year several investigations by experts were made on the North Shore. It would seem that no difficulty is now experienced in concentrating these sands and of freeing them from the titanium they contain, but much attention is being given to their agglomeration which alone can allow of their being treated in blast furnaces.

From a paper by Professor Henry Louis, of the Iron and Steel Institute of England, it appears that at Herrang on the shores of the Baltic in Sweden, an impure magnetite is worked which contains from 35 to 40 per cent of magnetic iron and from 1 to 1.5 per cent of sulphur. This ore is crushed, concentrated magnetically, shaped into briquets which are agglomerated by melting in a continuous horizontal chamber or oven heated partly by the gases of the blast furnace, the temperature obtained being 1300° centigrade. Hard and well agglomerated briquets are thus obtained yielding about 63% of iron, with practically no sulphur, which are afterwards treated in charcoal blast furnaces. If this process be a success, as stated by the author of the paper who inspected our deposits of magnetic sand last summer, it seems to me that it might be applied to our magnetic sand which does not require crushing, which contains no sulphur and, in the concentrated state, contains an average of 70%.

In New Zealand, where there are considerable deposits of magnetic sand, the Government holds out great inducements for the treatment of this ore. It is reported that trials on a large scale have been made by means of the Heskett-Moore process consisting in heating the oxyde of

iron which is then subjected to the action of a current of reducing gas, the metallic particles being afterwards sent to the smelter. By this process malleable iron or steel is obtained directly, but information is lacking with regard to the practical importance of this process.

The commission sent to Europe last year under the direction of Dr E. Haanel, to study electro-thermic processes applied to iron metallurgy, has published an extensive report with conclusions of particular interest to our region which may be summed up as follows:

1. Steel of superior quality can be produced more economically than by the crucible process:

2. Ordinary steel cannot be produced as economically as by the Siemens or Bessemer process.

3. As it is established that reactions in the electric furnace are the same as in blast furnaces, the same qualities of pig-iron can be otained, but under inferior economic conditions. It has been estimated that with coke, worth $7.00 a ton thecost price would compare with electric power at $10.00 per electric horse-power per annum.

Under ordinary conditions electricity is inferior and can be profitably used only in special cases.

This statement is very important for many people in this country, possessing wrong information, are under the impression that treatment by electricity should replace the treatment by blast furnaces, while in reality this end is not yet attained.

The principle may thus be laid down that, as we have no fuel, we must until further orders seek above all a market for our ores.

MANUFACTURE OF CHARCOAL PIG-IRON.

The blast furnaces of Radnor and Drummondville worked regularly with the following results:

Ore charged.....	24857 $\frac{395}{2000}$	tons worth.....	$ 89704 99
Limestone charged.....	3002 $\frac{1770}{2000}$	" "	1461 45
Charcoal charged	1,446,607 bushels	worth.....	118552 50

which produced 11120 $\frac{1779}{2000}$ tons of pig-iron worth $256,376.65.

The ore used is chiefly bog ore of this province; nevertheless 8,705 tons of ore coming mostly from Ontario and 200 tons of hematite from the Eastern Townships were used; so that only 16,152 tons of ore of our province worth $54,884.00 were employed.

The 200 tons of hematite above mentioned were obtained by Messrs. John McDougall & Co., from Bolton township in the county of Brome.

TITANIC IRON.

There is nothing new to be said on the subject of titanic iron in connection with which experiments are being continued. This year again about one hundred tons were shipped from Kenogami and some applications were sent in for a product with a high percentage of titanium.

MANGANESE

No work was done in connection with this mineral on the Magdalen Islands.

The Magdalen Islands Company has sent in the following assays of its ores :

Metallic manganese	64 62
Oxyde of iron and alumina.....	1 55
Silica.....	1 40
Moisture.....	0 80
Sulphur.....	0
Phosphorus.....	0
Oxygen by difference.....	31 63
	100 00

	1	2	3	4
Manganese	50 36	56 56	49 32	51 29
Iron	10 62	0 82	1 44	3 89
Silica	1 62	0 70	5 84	3 96
Phosphorus	0 004	0 068	0 068	0 029

The derivation of these ores is as follows:

No. 1 from Grindstone; No. 2 and 3 from Etang du Nord; No. 4 from Amherst Island.

Assay of iron ore from Allright Island:

Iron	51 90
Silica	2 61
Sulphur	0 041
Phosphorus	0 041
Manganese	0 16
Water	10·75

Analysis of sand from beaches.

	1		2
Silica	96 00		98 65
Alumina	1 69		0 85
Peroxyde of iron	1 04		traces
Lime	0 45		0
Manganese	traces		traces
Magnesia	0 21		0
Loss by calcination	0 60		0
	99 99		99 40

No. 1 is natural sand; No. 2 is washed sand.

OCHRE

During the year 1590 tons of 2000 lbs of calcined ochre, worth $18,825 were extracted and prepared. This work was done as usual during the summer at St Malo near Three-Rivers by the Champlain Oxyde Co. and the Canada Paint Co., employing some fifty men.

The latter company did not work the mine of sulphate of baryta at Hull this year.

CHROMIC IRON

The chrome industry seems about to enter upon a new era, judging by this year's shipments which represent 5,740 long tons of chrome ores, 1718 being in rock and 4022 of concentrated of a value of $71,499.00 against 3020 tons worth $45,300.00 in 1903.

The ore is shipped to the United States and a little goes to Europe while some hundreds of tons are employed in Canada by the Electric Reduction Company of Buckingham, for the manufacture of ferro-chrome.

The Black Lake Chrome and Asbestos Company has had its two concentration mills in operation throughout the year at Lake Caribou and Black Lake. Electric power is used at Lake Caribou. Mining at shaft No. 1 and at Caribou shaft was continued systematically and showed supplies of ore sufficient to justify the erection of the aforesaid mills. The company worked No. 1 shaft chiefly, with good results and proposes to develop the works and install the necessary machinery. This company is the principal producer of the region and the average percentage of the first class concentrates shipped during the latter months of the year was 52%, some cargoes reached 54% and the percentage of silica did not exceed 3%. It also prepares a second grade of concentrates with a percentage of about 45%, which is used in the preparation of ferro-chrome.

The American Chrome Company and the Montreal Chrome Company did not work last year, while the Star Chrome Company merely did some prospecting on the Coleraine Indian reserve.

The Thetford Chrome Company got out and shipped a good quantity of ore in lumps and put up steam machinery for getting it out. The property has recently passed into other hands and a concentrator of a capacity of twelve tons per diem is being erected which will be driven by electricity and which it is hoped to have in operation in June.

The total output for the year was as follows:

1st class, in rock	616	long tons,	worth	$ 8193
2nd do do	1102	do	do	11020
Concentrate,	4022	do	do	52286
Total	5740			$71499 00

Ninety men are permanently employed in this industry for periods varying from 5 to 12 months.

COPPER.

The Eustis Company and the Nichols Chemical Company worked regularly throughout the year.

There is nothing special to remark as regards the Nichols Company, but the Eustis Company completed very important installations, mentioned last year, for using electric power, and I give below a brief description of the installation.

The power was obtained by building a dam 15 feet high across a rapid in the Coaticooke river, whence the water is brought by a wooden flume 7 feet in diameter to a stand-pipe 36 feet high, whence it is distributed to two pairs of turbines of 18 inches by a steel pipe of 7 feet in diameter giving 450 horse-power with a height of 32 feet. The power-house is 340 feet from the dam and place has been left for a third pair of turbines. The turbine shaft is directly connected to a 200 K. W. Westinghouse, three phase 2,200 volts rotary field generator. The exciter is operated by a separate 9 inch turbine. The power is conveyed to the mine, two miles

away, by three drawn copper wires, and it supplies the air compressor, the hoisting engine and the concentrating works The new machinery was put in by the Jenckes Machine Company, Ltd., of Sherbrooke, but the old steam machinery was retained for use in case of the electric power failing through accident. The compressor is driven by a 100 H.-P. Westinghouse 2,200 volt, constant speed, induction motor. The motor for the hoist is a Westinghouse 150 H.-P., three phase, 2,200 volt, variable speed induction motor, with a normal speed of 480 revolutions a minute. The controller is mounted on the engineer's platform, and has seven steps; it acts by connecting different resistances, in series, with the rotating part of the motor. The crushing and concentration plant is driven by a 50 H.-P., 200 volt, slow speed, Westinghouse induction motor, supplied through two 25 K. W. transformers.

The distribution of compressed air and the concentration have not affected the mine itself, while the hoisting by means of the new power has had a great effect on it. The hoisting is now done by means of a single shaft having a slope varying between 20 and 45 degrees, and a length of about 2000 feet. There are two tracks four feet wide, with steel rails of 56 lbs. The speed of ascent is 500 feet per minute, representing in all 5 to 6 minutes for the ascending and descending of a car containing 5 tons of ore, the total weight to be raised by the machinery being from 7 to 8 tons. The carload is dumped automatically into a bin from which the cars are filled that are hauled out through the tunnel by horses. Under the old system it took about 30 minutes for a car to ascend with its load and descend empty, while several men were required for the work.

The company will thus be in a position to greatly increase its output and a great improvement has been effected as regards the comfort of the workmen who are conveyed up and down the shaft by the machinery. The hoisting is effected by means of two cast iron drums of 48 inches by 72 in diameter, mounted on independent shafts $6^{5}/_{6}$ inches in diameter. These drums are driven by the electric motor by means of friction clutches and are controlled by friction brakes worked by hand, or by compressed air by the engineer. The motor has a capacity of 150 horse-power giving the wheels a speed of 480 revolutions to the minute. Signals are given

by lights, by bells and by telephone with an indicator showing the position of the cars in the shaft.

This electric installation is the first applied to mines in the province of Quebec and must be noted as marking the introduction of a new system of mining. For the technical details of the electric portion I refer to a description given in the December number of the *Canadian Mining Review*, page 241. On account of the work necessitated by this alteration in the plant, the output of the mine has been less than in previous years, but the company intends to develop it considerably by increasing the hoisting capacity of the mine and by at once concentrating the low grade ore. The company likewise proposes to erect special concentration works to utilize a couple of thousand tons of old debris that have been accumulating for many years.

The company employed over a hundred men throughout the year. It also did some work in the old Hepburn mine which it had already worked some years ago and whence a little good ore has been got out, the working having shown that an important deposit exists there.

The Nichols Chemical Company continued its work at the bottom on the vein of ore worked last year. It continues to use the ore in the manufacture of chemical products, preparing at the same time a matte containing 40% of copper from which it obtains 1 or 2 tons per diem. It also proposes to manufacture sulphate of soda. This company has established an office in Montreal in the Ottawa Bank Building.

No other work in connection with copper was done in the Eastern Townships. Mr A. O. Norton, who controls the King and Sutfield mines, did some prospecting during the season and proposes to develop those prospects.

It is still proposed to establish custom smelters for the use of mines in the Sherbrooke region.

Work has been abandoned at the Matanemines, but I understand that it is to be resumed this year.

In an exploration of the region south-west of Lake Mistassini, I found interesting outcroppings of chalcopyrite with a little bornite in the Chibogomo district.

GOLD

No work was done in the Beauce regions. Some twenty ounces were obtained by prospecting in the rivers.

At Dudswell, Mr Parsons has made preparations to work next spring in the Big Hollow Brook.

In an exploration made last year in the north of the province, I discovered gold-bearing quartz in the district of Lake Chibogomo. Prospecting will be carried on this year to ascertain the value of this discovery.

ASBESTOS.

The activity displayed last year in the asbestos mines, was maintained and all the Thetford mines were in operation with two new ones at Broughton, and all save one at Black Lake. Consequently the output this year is about 15% greater than in 1903, and it is likely to be greater still in 1905. Prices have also been very remunerative both for crude asbestos and for fibre.

Several important transactions took place during the year. The American Asbestos Company of Black Lake, became the owner of King Bros.' mine at Thetford and the Syracuse Asbestos Company acquired the control of the Reed mine on lots 27, 28, 29, range A, of Coleraine.

At Thetford the Bell, Johnson and King companies worked regularly throughout the year, both in the mines and in the mills. The Johnson Company also worked the mine and mill at Black Lake, but not so regu-

larly. The mine and mill of the Beaver Company were in operation only for a part of the year. At Black Lake, the Union and Standard companies worked steadily at the mines and mills The mine of the Montreal and Glasgow Company was prospected to a slight extent under contract, and the Manhattan mine was worked during the last months only, by Mr. Pharo who obtained the contract and also used the mill. The J. Reed property, comprising lots 27, 28 and 29 of range A. of Coleraine, has passed under the control of the Syracuse Asbestos Company, represented by Mr. E. L. Loomis, which developed the mine on a slight scale, and intends to build a mill this year.

Dr J. Reed prospected during the summer on lots V, 13 and IV 16 and 17 of Thetford and found good indications of serpentine showing asbestos. The latter lots were already mentioned some years ago as containing that mineral.

At Danville, the Asbestos and Asbestic Company was in full operation during the year with about 300 men and produced a considerable quantity of asbestos and asbectic which was shipped. The mills worked regularly and three derricks were added to the equipment of the mine.

The American Asbestos Company has completed its installation at Black Lake and the mill was put in operation during the summer, electric power generated on the spot by steam being used. In December the St Francis Water Power Company began supplying electric power generated on the St Francis river at d'Israeli and note should be taken of that date which opens a new era in the working of asbestos mines. In fact that company has been the first to utilize electric power, and it is possible that this example may be followed by others.

The American Asbestos Company has also acquired the property of King Bros. at Thetford, including mills, mines and all the plant, as well as lots 26 of range V. and 25 and 26 of range VI of Thetford. The definite transfer of this property took place at the beginning of 1905, but the King mine will be worked under the same management, retaining the same name under which its products are so well known on the asbestos market. I give below a brief description of the installation of the American Asbestos Company at Black Lake.

The mill consists of several frame buildings containing machinery as follows:

1. A building containing a Blake crusher from which the broken rock goes to an elevator and then to two cylindrical driers, from the end of which the dried product goes to the following building:

2. A building containing 2 large Sturtevant crushers with 8 smaller ones, on the same system, connected with 8 beaters and 8 settling rooms for the fibres, the whole system being connected by means of elevators, endless belts, shaking screens, suction fans, etc. Finally there is an emery crusher for crushing fibrous rock for special product.

3. A building serving as a settling room to which the fibre is driven from the last mentioned one by a current of air. The fibre is put in bags, stored and shipped by rail.

4. A building containing 2 boilers of 150 horse-power each to supplement the electric power supplied from outside. In a division of the same building, the machinery-room contains a large central dynamo and a steam engine for producing electricity.

5. A building used as a wood and iron repair shop for repairing the plant.

The sand residue from the mill is conveyed by an endless belt to a large hopper whence it is taken with the other debris to the other side of the railway.

The chief feature of this new installation is that the defiberizing work is no longer done with the cyclone, but by means of the new Sturtevant crushers which seem to give good results.

Work in the mine is done on the usual system. The company proposes to develop the workable surface connecting the two quarries already opened and which show very fine indications of asbestos. Cable derricks have been put up and conveyance to the mill is effected by a tramway with cars of a capacity of four tons and two small locomotives. The rock so conveyed to the mill is dumped into a sort of tower, whence it is distributed to the mill, thus making it easy to work day and night, the mill being lighted by electricity.

The installation on the whole is very remarkable and complete and the fact of the introduction of electric power is very important for the development of this region.

The Quebec Asbestos Company has been organized to develop the Walsh and Mulvena mine situate in the centre of lot 13 range VI of Broughton, about two hundred yards from East Broughton station. The asbestos on this property differs slightly from that of the other districts: the serpentine belt is barely 150 feet wide and the rock presents a schistous aspect, but contains a large quantity of fibre which does not produce much crude asbestos, but can easily be treated in the mill. The company has therefore built a mill on the same principle as those already in operation in the other districts and whereof the following is a brief description:

The mill consists of a three story frame structure 47x76 feet, containing a Blake crusher 24x15 in the upper story which receives the rock direct from the mine. The rock passes into a cylindrical drier 30x15, then into a cylindrical Butterworth crusher. It is afterwards treated in two Jumbo defiberizers and two cyclones with the usual adjuncts of shaking screens and suction fans connected by hoists.

The power is supplied by two boilers of 100 H. P. each, running a Corliss steam-engine 16x36 supplied by the Jenckes Machine Company. The boilers are in a separate building.

The mine, consisting of an excavation 200' x 60' is worked by a cable derrick and a boom derrick. The mine and mill were put in operation during the summer and the mill, which has a capacity of 150 tons of rock per diem, has given good results. The company employs about 75 men. The mill is lighted by electricity.

The mill of the East Broughton Asbestos Company, which was burnt last year, was rebuilt and put in operation last spring. The work of rebuilding the mill was begun at the end of January 1904 and finished at the end of May.

The installation consists of a building situate 50 feet from the mill proper which contains two boilers of 125 and 75 H. P. respectively. The machine-room contains a 9 H. P. engine driving the crushers, driers and conveyers. The steam from this engine passes through a series of pipes on

which the surplus material is piled and goes through a first drying. The crusher is connected by three lines of tramway with the various derricks of the mine and is fed by a shaking trough. The rock then passes into two cylindrical driers 28″ x 30″ heated directly, but through which a current of hot air also passes. The crushed and dried rock is conveyed by an endless rubber belt to the third story of the mill whence it is distributed to the various machines where the fibre is removed and the debris taken outside the mill.

The mill consists of a building 72′x36′, with an annex 30′x48′ for a 150 H. P. engine (16′x36′).

The rock taken from the first building is fed to a cylindrical crusher, the surplus going to the reserve as above mentioned : from that point all the machines are in duplicate, while the two groups of machines can be worked independently of one another.

The rock issuing from the crusher is of the size of a nut and passes through Jumbo disintegrators already described in connection with other installations : from there it is conveyed to shaking screens from which a certain quantity of fibre is removed by suction. Above these screens are electro-magnets which attract all particles of iron that may be mixed with the rock. The material left on the screens goes to two cyclones, then to other shaking screens from which the fibre is removed by suction and proceeds to the settling-rooms ; from there it falls on other screens to have the dust removed and is sucked into other settling-rooms, whence it goes to separators to be separated according to quality ; the latter consist of revolving screens and the distribution is regulated by a last shaking screen.

The mill has a capacity of 150 tons of rock per diem and is lighted by electricity. The mine consists of a great excavation 200 x 100 and 60 feet deep with another smaller excavation in the neighborhood served by a special steam engine. The extraction is effected by means of derricks.

The total production of asbestos for the whole year was as follows, in tons of 2000 pounds.

1st class crude	1645	tons worth	$251,818.00
2nd " "	2727	" "	265,961.00
Fibre	7771	" "	229,801.00
Paper stock	23336	" "	439,215.00
Total	35479		$1,186,795.00
Asbestic	13149	" "	13,124.00

1775 workmen were employed in this industry for periods of from 5 to 12 months, receiving $460,300.00 in wages

MICA

No work to any great extent was done in the mica mines last year and this seems to be due to the more general use of micanite which, as already explained, consists of very thin sheets of mica stuck together and pressed. Much smaller mica is used for this after having been transformed into *split mica*. Thus small mica of an inch square and upward is used, and prices for such dimensions, are low while the prices offered for large mica are lower and it is less used.

In Ottawa there are several companies that prepare this split mica which is shipped to the United States where it is subject to a duty of six cents only per pound.

The Blackburn Brothers mine was in operation throughout the year with about 60 men and a considerable quantity of mica was got out which was shipped to Ottawa. There some fifty young girls are employed by the company in preparing the split mica which is sent to the United States and to Europe. This company also worked with ten men during one-half the year on lots 17 and 18 of Templeton Gore and got out a certain quantity of mica.

The Wallingford Mica and Mining Company worked for seven months with twenty men and got out a good quantity.

Messrs Fortin and Gravelle did not work this year.

Messrs Kent Brothers worked on lots VI, 14 of Hull, the mica being shipped in the raw state to Kingston to be prepared.

The Laurentide Mica Company worked the Aberdeen mine (VII, S½, 19) in Hull formerly owned by Messrs Brown Bros. About 40 men were employed and steam machinery was installed. A good quantity of mica was got out and shipped to Ottawa to the workshops of the company which employs a hundred girls in splitting mica. This company, which specially prepares split mica, also purchases raw or thumb-trimmed mica from other producers.

The other companies did not work and contented themselves with disposing of the product they have on hand.

The quantity shipped this year may be figured up as follows, in split and thumb-trimmed mica :

1/1	3200	lbs worth	$ 164
1/2	46680	"	3404
1/3	100885	"	16100
2/3	88550	"	23856
2/4	36450	"	13800
3/5	14350	"	12500
4/6	8050	"	9400
5/8	3400	"	5800
Total	301565		$85024

212 persons were employed for periods of from 6 to 12 months, including about 80 women employed in splitting in Ottawa,

No work was done this year in the white mica mines.

PHOSPHATE

According to Mr. F. Higginson the quantity of phosphate utilized this year is only

480 tons of 1st class worth		$ 3840
250 " " 2nd " "		$ 750
Total	730	$ 4590

This phosphate is the accessory product of some of the mica mines, the greater portion having been supplied by the Blackburn mine and a small quantity obtained from some workings on the Lièvre. The Chemical and Fertilizer Company is now established at Buckingham where it manufactures superphosphate chiefly with second class material, while the higher grade is used by the Electric Reduction Company of the same place for the manufacture of phosphorus.

GRAPHITE

The only company manufacturing this last year was the Anglo-Canadian Graphite Syndicate, Ltd, of Birmingham, England, organized last year. This company took possession in January 1904 of the mines and mills of the former North-American Company and, with its new processes and the patents of Mr. H. P. H. Brunell, the managing director, applied to the old mill, it prepares merchantable graphite of good quality, a portion whereof is shipped to England.

COMBUSTIBLE NATURAL GAS

Boring for natural gas had been given up for many years, but last year Mr. J. D. Bilodeau of St-Grégoire, county of Nicolet, organized a company called *The Canadian Gas and Oil Company* which began boring in the Beaucéjour range near the old Trudel well opened in 1886 and which, after yielding a good supply of gas, still yields some which is used by the owner for heat and light and also for supplying motive power to a small mill. I would here recall the fact that the Trudel well had been carried down to 1100 feet, but an abundance of gas was found at about 600 feet where medina red schist was struck.

The new company is provided with a good plant and employs trained workmen from Pennsylvania. During the autumn it sank two wells to 814 and 801 feet respectively with a diameter of 5⅜ inches which struck red schist at 485 and 450 feet. The latter well is 400 feet southwest of Trudel's. Neither of these wells struck gas and the company suspended work for the winter, but will resume it in spring, having obtained from the property owners the right to bore over 18000 acres of land. The wells are on lots Nos 253 and 157 of the cadastre, the Trudel well being on No 501.

This natural gas is used in several other parts of the province; amongst others at Yamachiche, Louiseville, St. Barnabé, Ste. Geneviève de Batiscan. Some has also recently been discovered at St. Pierre les Becquets.

At these places slight borings have been effected by hand through the clay and the gas issuing from the gravel beds is used for heating and lighting houses.

A certain number of property owners have done this boring, which is inexpensive and all appear very well satisfied.

MINERAL WATERS

Analysis by Mr. Milton L. Hersey of mineral water from the Abenakis Springs, county of Yamaska P. Q.

	Thousandths of milligrammes per litre	Grains per Imperial Gallon	Grains per U. S. Gallon
Chloride of Sodium	10876	761.32	634.45
Chloride of Lithium	trace	trace	trace
Chloride of Calcium	959	67.13	55.94
Chloride of Magnesium	1326	92.82	77.35
Iodide of Sodium	trace	trace	trace
Bromide of Sodium	trace	trace	trace
Sulphate of Sodium	1082	75.74	63.12
Sulphate of Potash	90	6.30	5.25
Phosphate of Soda	1	0.07	0.06
Nitrate of Soda	5	0.35	0.29
Bicarbonate of Lime	642	44.94	37.45
Bicarbonate of Iron	25	1.75	1.46
Alumina	trace	trace	trace
Silica	14	0.98	0.82
Total	15020	1051.40	876.17

These springs are operated by the Abenakis Springs Hotel Company.

MISCELLANEOUS AND BUILDING MATERIALS

Last year no feldspar or sulphate of baryta was got out. The manganese and gypsum deposits of the Magdalen Islands have not yet been worked. Experiments in connection with the use of peat are being continued at Farnham, but none has been manufactured for commercial purposes,

No work was done at the Murray Bay mica mine where I pointed out the existence of radium last year, but when I again visited the mine, I found other specimens of the uranium ore it contains.

CEMENT.

The only company in operation during the year was that of Thomas M. Morgan, of Longue Pointe, Montreal, which worked regularly.

The International Portland Cement Co., Ltd., of Hull, has completed its installation and was to begin working in January, 1905. A description of this installation will be given in our next report.

BUILDING MATERIALS, LIME, BRICK, STONE, ETC.

There is nothing special to mention in connection with this industry which continues to develop regularly with an increased production yearly.

The figures given for the production are approximate, for it is practically impossible to obtain the exact figures every year.

STATISTICS.

In the following tables will be seen the total products of the mines shipped or used on the spot, from the operators' reports, with their gross value at the nearest shipping point.

SUMMARY STATEMENT OF THE YIELD OF THE MINES IN THE PROVINCE OF QUEBEC, FOR THE YEAR 1904.

KIND OF MINERALS. (Tons of 2,000 lbs)	Wages paid.	Number of workmen.	Quantities shipped or used.	Gross value.
Titanic iron ore	.....	.....	100	$ 300
Bog iron ore	30000	120	16152	54884
Chromic iron	27200	90	6429	71499
Copper ore	73544	234	23729	95000
Asbestos	460300	...1775	35479	1186795
Asbestic	.....	.....	13149	13124
Mica (lbs)	48099	212	301565	85024
Ochre calcined	9227	51	1590	18825
Graphite	2000	45	25	2300
Phosphate	.....	.....	730	4590
Gold (ounces)	.....	.....	20	180
Slates (squares)	14400	50	5277	23247
Flag stones (square yards)	1750	6	3000	2550
Cement (barrels)	23000	54	33500	50250
Granite	70000	180	.....	120000
Lime (bushels)		350	1 million	140000
Bricks	600000	1200	120 "	625000
Stones		700	.....	530000
Totals,	1359520	5067	.....	$3023568

In 1904 the value of mining products was $3,023,568.00 of mineral matter shipped or used, the value being calculated near the mines, in the raw state or after undergoing a first preparation to make the product merchantable.

5067 workmen were employed for periods varying from 2 to 12 months, receiving $1,359,520.00 in wages.

From reports received, 4 men were killed, and 4 seriously injured in mining accidents.

The quantity of charcoal pig-iron manufactured was 11,120 tons of 2000 lbs. worth $256,376,00.

LIST OF MINING COMPANIES IN THE PROVINCE OF QUEBEC IN OPERATION OR IN A POSITION TO WORK DURING THE YEAR, WITH THEIR ADDRESSES

MAGNETIC SAND.

H. C. Bossé, 113 St-Peter Street, Quebec.
W. Robertson, 233, St-James Street, Montreal.

CHARCOAL PIG IRON

The Canada Iron Furnace Co., Canada Life Building, Montrea..
John McDougall & Co., 597, William street, Montreal.

TITANIC IRON

G. Gagnon, 87, Artillery Street, Quebec.

OCHRE

The Canada Paint Co., Ltd., 572, William street, Montreal.
The Champlain Oxyde Co. (Lucien Carignan), Three-Rivers.

CHROMIC IRON

Black Lake Chrome & Asbestos Co., ,Black Lake, Megantic Co.
American Chrome Co., Black Lake.
Montreal Chrome Iron Co., Ltd., Coleraine, Megantic Co.
Star Chrome Co., Coleraine.
Thetford Chrome Co., Thetford Mines, Megantic Co.
King Bros Co., Thetford Mines.
R. T. Hopper, Merchants Bank Building Montreal.
L. A. Carrier & Co., Levis.

COPPER

Eustis Mining Co., Eustis, Sherbrooke Co.
The Nichol's Chemical Co., Ltd., Capelton, Sherbrooke Co.
J. McCaw, Sherbrooke.
G. E. Smith, do.
James Reed, Reedsdale, Megantic Co.
A. O. Norton, 280, Congress street, Boston, Mass.
The Matane Mining & Smelting Co., Ltd., Matane.

LEAD

The British Canadian Lead Co., Ltd., Lake Temiscamingue, Pontiac Co.

GOLD

The Gilbert River Gold Fields, Ltd., Saint-François, Beauce Co.
The Dominion Mining Co., (C. A. Parson) P. O. B. 313, Boston, Mass.
Louis Mathieu & Cie., East Angus, Compton Co.

GRAPHITE

The Anglo Canadian Graphite Syndicate, Ltd., Buckingham. Ottawa Co.
The Walker Mining Co., Graphite City, Buckingham.
The Buckingham Co., Buckingham.
Calumet Graphite Co., Calumet.

MANGANESE

The Magdalen Islands Co., 92, St-Peter Street, Quebec.

ASBESTOS

Bell Asbestos Co., Ltd., Thetford Mines, Megantic Co.
King Bros. Co., Ltd., Thetford Mines.
Johnson Asbestos Co., Thetford Mines.
The Beaver Asbestos Co., Thetford Mines.
American Asbestos Co., Ltd., Black Lake, Megantic Co.
The Standard Asbestos Co., Ltd., Black Lake.
The Glasgow & Montreal Asbestos Co., Black Lake.
Manhattan Asbestos Co., Black Lake.
Union Asbestos Mine, Black Lake.

Syracuse Asbestos Co., Black Lake.
James Reed, Reedsdale, Megantic Co.
The Broughton Asbestos Co., Ltd., East Broughton, Beauce Co.
The Quebec Asbestos Co., East Broughton.
The Asbestos & Asbestic Co., Ltd., Danville, Richmond Co.
The Ottawa Asbestos Mining Co., 514, Sussex Str., Ottawa.

MICA

The Wallingford Mica & Mining Co., 41, Duke Str, Ottawa.
Blackburn Bros., 46, Sussex Str., Ottawa.
General Electric Co., Isabella Str., Ottawa.
Fortin & Gravelle, Hull. Co., Ottawa.
The Laurentide Mica Co., Ltd., Bridge and Queen Str., Ottawa.
Mica Manufacturing Co., Ltd., Rideau Str., Ottawa.
Vavassour Mining Association (T. F. Nellis). 22 Metcalfe Str., Ottawa.
The Wakefield Mica Co., 354, Wellington Str., Ottawa.
Lila Mining Co., (D. L. McLean), 5, Sparks Str., Ottawa.
Chs. Guertin, 15 Division Str., Ottawa.
The Allan Gold Reefs Co., Ltd, Victoria Chambers, Ottawa.
Wesbter & Co., 274, Stewart Str,. Ottawa.
E. T. Watters, Metropolitan Build ng, Ottawa.
Brown Bros., Cantley, Ottawa Co.
Lewis McLaurin, East Templeton, Ottawa Co.
Richard Moore, Pickanock, Ottawa Co.
Joshua Ellard, Pickanock.
The Glen Almond Mica & Mining Co., Buckingham, Ottawa Co.
Fleury Bros., Old Chelsea, Ottawa Co.
Edward Watts, Buckingham, Ottawa Co.
Kent Bros, Kingston, Ont.

PURCHASERS OF MICA

The Laurentide Mica Co., Ltd., Bridge and Queen Str., Ottawa.
Sills Eddy Mica Co., 398, Wellington Str., Ottawa.
Eugene Munsell & Co., 332 Wellington Str., Ottawa.
General Electric Co., Isabella Str., Ottawa.
Webster & Co., 274, Stewart Str., Ottawa.
F. D. Moore 354 Wellington Str., Ottawa.

PHOSPHATE

J. F. Higginson, Buckingham, Ottawa Co.

PETROLEUM

The Petroleum Oil Trust Co., Ltd., Gaspé Basin, Gaspé Co.

COMBUSTIBLE NATURAL GAS

The Canadian Gas and Oil Co., St Grégoire Nicolet Co.

FELDSPAR

W. A. Allan, Victoria Chambers, Ottawa.

SULPHATE OF BARYTA

The Canada Paint Co., 572, William Str., Montreal.

PEAT

The Imperial Light, Heat & Power Co., Ltd., Liverpool, London & Globe Building, Montreal.

SLATE

Rockland Slate Quarry, New Rockland, Richmond Co.

FLAGSTONES

F. R. Bishop, Bishop's Crossing, Wolfe Co.

CEMENT

Th. M. Morgan, Longue Pointe, Montreal.
International Portland Cement Co., Ltd., Hull, Ottawa Co.

GRANITE

Stanstead Granite Quarries Co., Ltd., Beebe Plain, Stanstead Co.
S. B. Norton, Beebe Plain.
James Brodie, Graniteville, Stanstead Co.
The Whitton Granite Quarry Co. St Victor de Tring.
M. Fitzgerald, Ste Cécile, Compton Co.

Jean Voyer & Fils, Rivière à Pierre, Portneuf Co.
Joseph Perron, Rivière à Pierre.
M. P. Davis. 48, Central Chambers, Ottawa.
J. Brunet (Laurentian Granite Quarry), Côte des Neiges, Montreal.
J. A. Nadeau, Iberville.

BRICKS.—(The principal companies).

Thos. W. Peel & Co., Montreal.
J. Brunet & Cie., Montreal.
Chs. Sheppard & Son, Montreal.
Joseph Bernier, Montreal.
Joseph Descarries, Montreal.
Laprairie Brick Co., Laprairie.
Narcisse Blais, Quebec.
Frs. Grenon, Quebec.
Paradis & Létourneau, Quebec.
Laliberté & Fils, St-Jean Deschaillons, Lotbinière Co.
Victor Charland, St-Jean Deschaillons, Lotbinière Co.
D. G. Loomis & Son, Sherbrooke.
Eastern Townships Brick & Manufacturing Co., Sherbrooke.

LIME—(The Principal Companies).

Dominion Lime Co., Sherbrooke.
Cyrille Gervais, Montreal.
Olivier Limoges, Montreal.
Montreal Lime Co., Montreal.

To this list must be added that of companies using certain products of the mines to be manufactured in this province.

The Electric Reduction Co., Ltd, Buckingham, (ferrochrome and phosphorus).
The Chemical & Fertilizer Co., Buckingham.
Mica Boiler Covering Co., Ltd, 92, Ann St, Montreal.
Electro Manganese Reduction Co., Shawenegan.
Standard Chemical Co., Coaticook, (acetate of lime).
The Standard Drain Pipe Co. Ltd, Saint Jean d'Iberville.
C. E. Dubord, Beauport, (refractory clay).
Geo. Bélanger, Beauport, (refractory clay).
The Montreal Terra Cotta Co. Ltd, Maisonneuve.

MILTON L. HERSEY, M. Sc., GOVERNMENT ASSAY LABORATORY,

146, *St James street, Montreal, Que.*

Telephone (long distance) Main 252.

FEES FOR ASSAYS AND ANALYSES.

		4 samples or less at one time each.	More than 4 at one time, each.
Gold		$1.00	$0.90
Silver		1.00	0.90
Gold and Silver		1.00	0.90
Copper		1.00	0.90
Lead		1.25	1.15
Zinc		1.50	1.35
Nickel		2.00	1.80
Platinum		2.00	1.80
Arsenic		2.00	1.80
Manganese		2.00	1.80
Chromium		2.00	1.80
Antimony		2.00	1.80
Bismuth		2.00	1.80
Silica	smelting quality of iron ores	1.00	0.90
Iron (metallic)		1.00	0.90
Phosphorus		2.00	1.80
Titanium		1.50	1.35
Sulphur		1.50	1.35
Alumina		1.50	1.35
Ferric Oxide		1.00	0.90
Lime		1.50	1.35
Magnesia		1.50	1.35
Graphite		1.50	1.35
Moisture		0.25	0.25
Combined Water		0.50	0.50
Insoluble Matter		0.50	0.50

Identification of Minerals.—The laboratory is prepared to issue a report on samples, giving description as far as may be determined by rough qualitative tests, with the probable metallic contents or commercial value of the sample. A nominal fee of 25 c. is charged for each sample.

Determination of radio-activity of a mineral	$1.00
Ascertaining the presence of radium	3.00

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